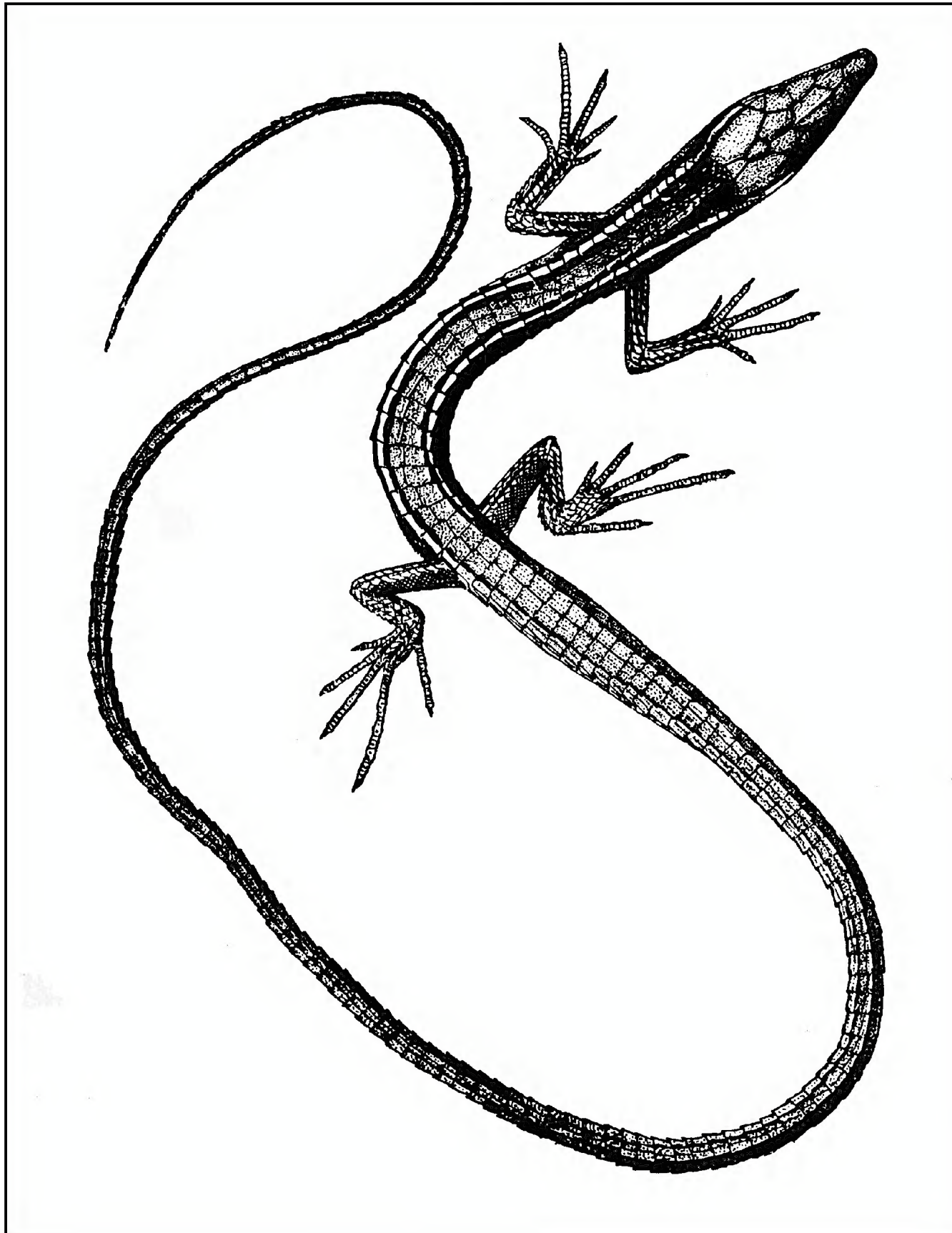

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BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Report on a Population of Spotted Turtles, *Clemmys guttata*, in Western Erie County, Pennsylvania

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Abstract

A population of spotted turtles (*Clemmys guttata*) was studied using mark–recapture methods during the spring and summer months of 1998–2003 in western Erie County, Pennsylvania. The adult spotted turtle population was estimated to be 40 turtles (35–45, 95% confidence interval). Density was calculated for the total study area (6.08 turtles/ha) and for the utilized habitat (19.05 turtles/ha). Density of turtles at the Erie County site was slightly higher than density estimates of several other populations, but lower than reported for southeastern Pennsylvania by Ernst (1976). Biomass was 3.45 kg/ha for utilized habitat and 1.16 kg/ha for the total study area. Morphometrics were compared sexes, with females having significantly greater plastron length (PL), relative plastron length, shell height, and relative shell height measurements. Carapace length (CL) and carapace width (CW) were similar between males and females. Mass of Erie County spotted turtles ranged from 88 to 241 g; mean body weight between sexes were not significantly different. Mean estimated age (annuli count) of males and females was 15 yrs. Adult males ($n = 5$) and females ($n = 6 - 7$) had similar growth rates of both the plastron and carapace (male CL $\bar{x} = 0.92$ mm/yr, PL $\bar{x} = 0.56$ mm/yr; female CL $\bar{x} = 1.06$ mm/yr, PL $\bar{x} = 0.75$ mm/yr). Data regarding behavior, weight gain and loss, cloacal and environmental temperatures are also presented. The results of this study add significantly to our knowledge of *C. guttata* in Pennsylvania. Furthermore, these data may be of use in developing conservation or management plans for this species.

Introduction

The spotted turtle, *Clemmys guttata*, is a small species of freshwater turtle which attains a maximum carapace length of 13.64 cm (Taylor, 1991). The species occupies suitable habitat in much of the Northeast, including southern Ontario, through New England, New York, Pennsylvania, southward along the Atlantic Coastal Plain to northern Florida. In the Midwest it is found in northern parts of Ohio and Indiana, Michigan and northeast Illinois (Ernst et al., 1994; Conant and Collins, 1998). Spotted turtles usually are found in shallow wetlands, such as swamps, bogs, marshes, and vernal pools—habitats which are prone to succession. Therefore, it is important that *C. guttata* inhabit wetland complexes containing areas in various stages of succession, so that turtles can migrate from one area to another as their former habitat becomes unsuitable (Burke et al., 2000). Although once very common, the spotted turtle is reported to be in decline over much of its range, primarily because of habitat destruction and collection for the pet trade (Ernst et al., 1994; Tynning, 1997). By the late 1980s, populations in Lancaster County, Pennsylvania, including Ernst's primary study population, were described as "small and in decline" (Ernst and Zug, 1994).

The goals of this study were to collect and analyze data regarding shell parameters, body weight, growth, age, behavior, population size, density, and biomass of *C. guttata* from Erie County, Pennsylvania, and to compare these with data from other populations.

Materials and Methods

Study site - A mark–recapture study was conducted on a population of *Clemmys guttata* in western Erie County, Penn-

sylvania from 1998 to 2003. The study area was approximately 6.25 ha and consisted of palustrine woodland, old field and wetlands. The wetlands where observations were made included an abandoned beaver pond (1.37 ha) and a nearby vernal pool (0.72 ha). The most prevalent tree species in the woods surrounding the wetlands were red maple (*Acer rubrum*) and sugar maple (*A. saccharum*), with yellow birch (*Betula alleghaniensis*), white oak (*Quercus alba*), sassafras (*Sassafras albidum*), and tulip tree (*Liriodendron tulipifera*) also present. The understory was vegetated with may-apple (*Podophyllum peltatum*), sensitive fern (*Onoclea sensibilis*), cinnamon fern (*Osmunda cinnamomea*), interrupted fern (*O. claytoniana*), royal fern (*O. regalis*), poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), and partridgeberry (*Mitchella repens*); in wetter areas, sphagnum moss was present. The old field habitat was dominated by goldenrods (*Solidago* sp.) and grasses. The soil was sandy and was used for nesting by the midland painted turtle, *Chrysemys picta marginata*, and possibly *Clemmys guttata*. The vernal pool was shallow, the deepest area being less than 1 m, and most portions 0.5 m deep or less. The bottom of the pool was covered with a thick layer of leaf litter. Lady's-thumb (*Polygonum persicaria*), *O. regalis*, *Sphagnum* sp. and willows (*Salix* sp.) grew in the vernal pool. Larvae of wood frog (*Rana sylvatica*), northern green frog (*R. clamitans melanota*) and spotted salamander (*Ambystoma maculatum*) also used the vernal pool. The beaver pond, ca. 20 m ENE of the vernal pool, was vegetated with *Salix* sp., smartweed (*Polygonum* sp.), and grasses. The deepest portion of the beaver pond was about 1.5 m deep, and the bottom consisted of mud with a lesser accumulation of leaf litter. The larvae of the gray tree-frog (*Hyla versicolor*), American bullfrog (*R. catesbeiana*), *R.*

c. melanota, *R. sylvatica* and *A. maculatum* occurred in the beaver pond. In addition to spotted turtles, midland painted turtles (*C. p. marginata*) and snapping turtles (*Chelydra s. serpentina*) were also observed in both wetlands. In most years the vernal pool dried by August, and the beaver pond dried by September. In early winter of most years both habitats began to refill.

Data collection - Field work was conducted on 31 days for a total of 154 field hours. Turtles were most frequently captured by hand, but were also occasionally taken in basking and funnel traps. Sardines, canned tuna fish, and canned cat food were used in baited traps. The following data were recorded each time a turtle was captured: date and time of capture; sex; estimated age (growth annuli counted); behavior prior to capture; habitat; weather conditions; environmental and cloacal temperatures; body weight; characteristics of the plastron and carapace; and straight line measurements. Sex was determined based on the following characters: in males, a concave plastron, vent beyond the carapacial margin, and a tan or dark chin; in females, flat or convex plastron, vent not beyond the carapacial margin, and a yellow or reddish yellow chin (Ernst et al., 1994). Turtles were considered mature if plastron length was greater than 80 mm. Age was estimated by counting growth annuli on the abdominal scutes (Graham, 1979; Zug, 1991). Behavior was recorded for each turtle for the period immediately before capture. Therefore, a turtle that was basking, and exited its basking site to elude capture, was recorded as basking. Air temperature (AT) at time of capture was taken with an armor-cased thermometer (-30 to 50°C / 1°) at chest level, regardless of sun or shade. Water temperature (WT) was taken ca. 100 mm below the surface at the capture site using an armor-cased thermometer similar to that which was used for air temperatures. Cloacal temperatures (CT) were taken immediately after capture using a Miller & Weber Inc. cloacal thermometer, accurate to 0.2°C. During processing, information regarding the condition of the carapace (smooth or rough), location and number of spots, as well as major anomalies and injuries were recorded. Anomalies and injuries on the plastron were also noted. In addition, photographs of the carapace and plastron of each turtle were taken to document new injuries and changes in pattern.

Turtles were weighed to the nearest gram with an Ohaus® electronic scale (model LS 2000P). The following shell parameters were measured with dial calipers accurate to the nearest 0.1 mm: carapace length (CL), carapace width (CW), shell height (SH), plastron length (PL), and abdominal scute suture length (AbSc). Relative plastron length (PL/CL) and relative shell height (SH/CL) were also calculated for each turtle. After data collection turtles were marked with a numbered monel tag (model #1005-1, National Band and Tag Co., Newport, Kentucky). Tags were fastened to the carapace with a Leatherman® tool after using a Dremel® Minimite cordless rotary tool to make a 1.58 mm hole in either the ninth or tenth marginal scute; with males being marked on the right and females on the left. Tags were placed so that room was available for subsequent growth. The drill bit was cleaned with 70% isopropyl alcohol between individual tagging episodes, and triple antibiotic ointment applied to the tag site after processing. After data collection and marking, usually less than

20 minutes, each turtle was released at its point of capture.

The population size and 95% confidence intervals (CI) were estimated using the Schnabel method (Overton and Davis, 1969; Seber, 1973; Graham, 1979). The equation used to estimate the size of the population was as follows:

$$N = \Sigma(n_i \times M_i) / \Sigma R_i,$$

where N is the population size, M_i is the total number of turtles marked prior to day i, n_i is the number of turtles caught in the sample on that day, and R_i is the number of recaptures caught on that day. The standard error was calculated as in Seber (1973). Density was estimated for both the forested area, including the wetlands, and also for just the wetland area. Density (D) was calculated using the equation:

$$D = N / A,$$

where N is the estimated population size, and A is the area of habitat. Biomass was also estimated for both the total area and the utilized habitat by multiplying the average weight (mass) of spotted turtles at the site by the population estimate, and then dividing by the total area of habitat. Statistical procedures followed Runyon et al. (1996). Student's *t*-tests and Chi-square tests were used to determine whether or not differences between male and female data in this study were statistically significant. These tests were also used to compare data between populations. Before performing a *t*-test, an *F*-ratio was calculated to determine whether the variances were homogeneous. When variances were heterogeneous, a corrected *t*-test was used to adjust for the inequality (Runyon et al., 1996). The significance level for all tests was $\alpha = 0.01$.

Results and discussion

A total of 38 spotted turtles were captured and recaptured 103 times; 77 by hand, 10 in basking traps, and 16 in funnel traps. Seventy-four percent ($n = 76$) of observations were made during sunny – mostly sunny weather, 18% ($n = 19$) while partly cloudy – partly sunny, and 8% ($n = 8$) while mostly cloudy – overcast. The study area was usually not visited if it was raining or if rain was imminent, therefore the number of observations on mostly cloudy – overcast days may underestimate spotted turtle activity during these weather conditions. However, the consequences of my bias may be minimal, as Ernst (1976) observed very few active *C. guttata* during rainy weather in Lancaster County, Pennsylvania.

Morphometric data - Data for 38 spotted turtles from this study are given in Table 1. There was no significant difference in mean CL between sexes ($t^c = -0.63$, $df = 36$, $p = 0.53$). Male CL ranged 80.7–121.8 mm, and female CL 85.5–114.8 mm. Carapace length of spotted turtles from the present study did not differ significantly from that reported by Hulse et al. (2001) for 98 mature turtles in the Carnegie Museum (males, $\bar{x} = 105.4 \pm 0.9$, $t^c = 0.99$, $df = 19.1$, $p = 0.34$; females, $\bar{x} = 102.4 \pm 1.5$, $t^c = 1.77$, $df = 17.7$, $p = 0.09$). A comparison of data from a Massachusetts population (Graham, 1995) produced mixed results; males had significantly smaller CL in Erie County, Pennsylvania ($t^c = -3.07$, $df = 20.1$, $p < 0.01$), whereas female CL was similar between sites ($t^c = -2.51$, $df = 18.7$, $p = 0.02$).

Table 1. Morphometric data for *Clemmys guttata*, from Erie County, Pennsylvania. CL = carapace length; CW = carapace width; PL = plastron length; SH = shell height. Significant differences between sexes are indicated by *. The superscript c indicates that a corrected *t*-test was employed. For CW, data were available for only 18 males and 15 females.

	Males (n = 20)			Females (n = 18)			<i>t</i>	<i>p</i>	df
	Mean	SD	Range	Mean	SD	Range			
CL (mm)	106.5	8.1	80.7 – 121.8	105.6	7.6	85.5 – 114.8	-0.63 ^c	0.53	36
CW (mm)	84.4	4.9	68.4 – 90.0	83.8	5.3	69.2 – 90.0	0.34	0.73	31
PL (mm)	88.3	5.2	71.6 – 94.9	94.0	7.8	73.8 – 101.9	-2.66	0.01*	36
PL/CL	0.82	0.03	0.76 – 0.89	0.89	0.02	0.85 – 0.92	-7.45 ^c	<0.0001*	34.3
SH (mm)	35.6	2.4	30.8 – 40.2	41.1	4.0	32.2 – 48.6	-5.13	<0.0001*	36
SH/CL	0.33	0.02	0.30 – 0.38	0.39	0.02	0.35 – 0.44	-7.61 ^c	<0.0001*	35.6

Plastron length in males ranged 71.6–94.9 mm, whereas female PL ranged 73.8–101.9 mm. Female PL was significantly greater than male PL ($t = 2.66$, $df = 36$, $p = 0.01$). The PL of Erie County female spotted turtles was significantly less than that reported for Ontario, Canada ($t = 4.70$, $df = 35$, $p < 0.01$), and Massachusetts ($t = 4.62$, $df = 41$, $p < 0.01$) (Graham, 1995; Litzgus and Brooks, 1998a). However, because the data for Ontario were composed only of gravid females, it may not be directly comparable to the Erie County data composed of both gravid and nongravid individuals. The latitudinal variation in CL and PL was not entirely unexpected, as Litzgus and Brooks (1999) reported that northern spotted turtles reach a larger mean adult body size compared to southern populations. A similar trend is observed in endothermic animals, such as birds, which tend to be larger in cooler (northern) climates than in warmer (southern) ones. Bergmann's rule, which describes this relationship, has traditionally not been applicable to ectotherms (Bolen, 1998); however, see Ashton and Feldman (2003) for results that suggest Bergmann's rule is followed by chelonians. Additional research, from a greater number of spotted turtle populations, is needed to determine whether or not there is a northward increase in CL and PL.

There was a significant difference in shell height (SH) between sexes, with females on average having a higher shell height than males ($t = -5.13$, $df = 36$, $p < 0.0001$). Male SH ranged 30.8–40.2 mm, female SH ranged 32.2–48.6 mm. Females also had significantly greater relative plastron lengths (PL/CL) ($t^c = -7.45$, $df = 36$, $p < 0.0001$), and greater relative shell height (SH/CL) values ($t^c = -7.61$, $df = 36$, $p < 0.0001$) (Table 1). Greater shell height in females may be an adaptation to accommodate eggs. In addition, females with relatively larger body size may be able to amass greater energy stores, and thus increase their reproductive effort (Dodd, 2001; Litzgus and Mousseau, 2003).

Body weight - Body weight (mass) in male spotted turtles ranged 88–225 g ($\bar{x} = 174.4$, $SD = 31.5$, $n = 20$); females ranged 92–241 g ($\bar{x} = 189.7$, $SD = 36.1$, $n = 18$), which was not significantly different ($t^c = -1.36$, $df = 32$, $p = 0.18$). Ernst et al. (1994) also report that adult males and females do not differ in average body weight. Mitchell (1994) reported the average mass of Virginia spotted turtles as 144.5 g in males and 164.5 g in females; which was significantly less than for

Erie County *C. guttata* (males, $t = 4.55$, $df = 67$, $p < 0.0001$; females, $t = 3.22$, $df = 57$, $p = 0.002$).

Forty-four observations of changes in body weight were available for 22 turtles. Changes in weight of 11 adult males were as follows: weight lost was between 0.5 and 6.0% ($\bar{x} = 3.0$, $SD = 2.1$, $n = 9$) of previous body weight (pbw), while weight gained in adult males ranged 0.6–16.7% pbw ($\bar{x} = 5.2$, $SD = 5.0$, $n = 13$). Gains and losses for 8 adult females were similar to that observed in males. Weight loss ranged 0.5 – 9.4% pbw ($\bar{x} = 4.5$, $SD = 4.2$, $n = 4$), whereas weight gained for females ranged 0.4–17.2% pbw ($\bar{x} = 7.9$, $SD = 6.0$, $n = 11$). The average number of days between observations for adults was 272, and ranged from one to 1086 days. Due to a lack of data, it was not possible to estimate weight loss in juveniles. Three juveniles gained between 6.3 to 45.5% pbw ($\bar{x} = 13.8$, $SD = 15.5$, $n = 6$). For juveniles, average number of days between observations was 367, and ranged up to 1084 days. The greatest change in weight (45.5% gain) was observed in turtle 0012. When first captured 26 April 1999, it weighed 88 g; when recaptured 15 April 2002, 1084 days later, its weight had increased to 128 g.

Age - Spotted turtles at the Erie County site were 8–21 yrs old at initial capture. There was no significant difference between male and female estimated age ($t = -0.04$, $df = 36$, $p = 0.97$). The youngest male captured was 8 yrs of age (a sub-adult), the oldest 21 yrs ($\bar{x} = 15$, $SD = 3.0$, $n = 20$); while the youngest female was 8 yrs old, and the oldest 20 yrs ($\bar{x} = 15$, $SD = 3.0$, $n = 18$). Several researchers have acknowledged the need for long-term studies of known-aged animals to test the validity of counting growth annuli as a method of estimating the age of turtles (Brooks et al., 1997; Germano and Bury, 1998; Dodd, 2001). Litzgus and Brooks (1998b), for instance, demonstrated that counting growth annuli was not reliable in determining the age of spotted turtles in an Ontario population. Similarly, a study of *C. serpentina* and *C. p. marginata* demonstrated that this technique frequently underestimated the ages of turtles; especially those older than 6–7 yrs (Brooks et al., 1997). In addition, Ernst (1975) reported that visible growth annuli may fail to be produced in *C. guttata* by 14 yrs in males, and 18 yrs in females. Therefore, spotted turtles in the present study that were estimated to be 20 yrs old were probably significantly older. *Clemmys guttata* have been

Table 2. Growth data for 14 *Clemmys guttata* from Erie County, Pennsylvania. Estimated age in years (annuli count) is given for the initial capture. Carapace length (CL) and plastron length (PL) in mm are given for the initial and latest captures. Estimated growth rate was calculated by dividing the increase in CL or PL by the time interval between captures. Juveniles are indicated by an *.

	Turtle	Estimated age (yrs)	Initial CL	Latest CL	Time interval (yrs)	Estimated CL growth (mm/yr)	Initial PL	Latest PL	Estimated PL growth (mm/yr)
Males	0008	13	105.2	106.8	3.01	0.53	86.4	87.5	0.37
	0012*	8	80.7	92.5	2.97	3.97	71.6	81.1	3.20
	0017	18	106.4	109.4	2.97	0.88	91.4	92.2	0.27
	0018*	12	96.3	111.6	4.00	3.82	81.6	87.2	1.40
	0022	18	106.0	106.6	2.13	0.28	86.3	87.2	0.42
	0025	13	105.1	110.2	2.05	2.49	86.7	88.8	1.02
	0031	21	114.5	115.0	1.18	0.42	89.5	90.0	0.42
Females	0002*	11	92.0	100.5	1.89	4.50	78.0	84.2	3.28
	0005	15	103.4	105.3	3.04	0.63	94.6	94.8	0.07
	0021	14	107.4	108.1	2.85	0.25	97.6	98.3	0.25
	0023	20	102.9	103.0	2.96	0.03	95.0	95.6	0.20
	0024	13	110.9	111.2	1.04	0.29	99.6	99.8	0.19
	0032	14	104.4	107.5	1.09	2.84	90.0	93.5	3.21
	0033	15	100.1	102.6	1.08	2.31	90.3	91.5	1.11

known to live at least 30 yrs in the wild (Ernst et al., 1994) and 42 yrs in captivity (Oliver, 1955).

Growth - Data regarding growth was available for 14 turtles, seven males and 7 females (Table 2). Growth rate, as expected, was greater in juveniles than adults. One juvenile male (0012), initially captured at 8 yrs of age, grew from 80.7 to 92.5 mm CL, and 71.6 to 81.1 mm PL, over a period of approximately 3 yrs. A second juvenile male (0018), 12 yrs old when first caught, grew from 96.3 to 111.6 mm CL and 81.6 to 87.2 mm PL, over a period of 4 yrs. Both of these subadult males initially had female-like shell morphology, tail shape, and chin coloration, which became male-like over time (Gray and Curtis, 2003). A juvenile female (0002) originally captured when 11 yrs old, at 92.0 mm CL, was recaptured about two years later with a 100.5 mm CL. Plastron length in this individual increased from 78.0 to 84.2 mm over the same period. Increases in PL of juveniles ranged 2.21–3.28 mm/yr ($\bar{x}$ = 2.90, SD = 0.60, n = 3). Growth rates of adult males and females were similar. Five adult males aged 13–21 yrs, increased in CL an average of 0.92 mm/yr (SD = 0.91, n = 5, range 0.28–2.49); PL in males increased an average of 0.56 mm/yr (SD = 0.46, n = 5, range 0.10–1.25); whereas CL of 6 adult females, aged 13–20 yrs, increased an average of 1.06 mm/yr (SD 1.20, n = 6, range 0.03–2.84), female PL increased an average of 0.75 mm/yr (SD = 1.14, n = 7, range 0.07–3.21). Plastron length of two adult Erie County *C. guttata* (one female and one male) aged 11 and 12 yrs, increased by 4.2 and 1.7%, respectively. This agrees with the 3.7% increase in PL for 12-year-old spotted turtles reported by both Ernst (1975) and Graham (1995). Data for six additional turtles, five males and one female, did not reveal any signifi-

cant increase in CL or PL upon being recaptured 1–4 yrs after their initial capture. Carapace lengths for these turtles ranged 98.7–116.6 mm, while estimated age at first capture was 11–20 yrs. The variation in growth rate observed between individuals of the same size and age is likely due to a combination of an individual's diet, health, and genetic makeup (Ernst and Zug, 1994). In addition, some genera of turtles (e.g., *Terrapene*) may not have indeterminate growth as is often assumed (Dodd, 2001).

Behavior and temperature - Spotted turtles at the Erie County site were active at ATs of 9–30°C, and WTs of 5–23°C. Cloacal temperatures of active Erie County spotted turtles were 6.4–29.8°C, within the range of 3–32°C obtained by Ernst (1982). The greatest number of captures (85%) occurred between March and May (Figure 1). These data are similar to those reported for Maryland, Massachusetts, Ohio, and southeastern Pennsylvania, where 74%, 92%, 93% and 68% of yearly captures, respectively, occurred during the same monthly period (Lovich, 1988; Milam and Melvin, 2001). In March and April capture rates for male *C. guttata* were nearly twice that of females, and were possibly due to males being more active while searching for mates (Ernst, 1982). Activity of Erie County *C. guttata* peaked in April, which is sooner than reported for Maryland, Ohio, or southeastern Pennsylvania (Lovich, 1988), and began to decrease in May as mean ATs began to approach 20°C. Very few Erie County spotted turtles were observed after mid-June. This is similar to southeast Pennsylvania, where turtles begin estivating by the end of June (Ernst, 1982), and are therefore less frequently seen. Lovich (1988) noted that *C. guttata* from various geographic regions were least active during the month when mean AT first exceed-

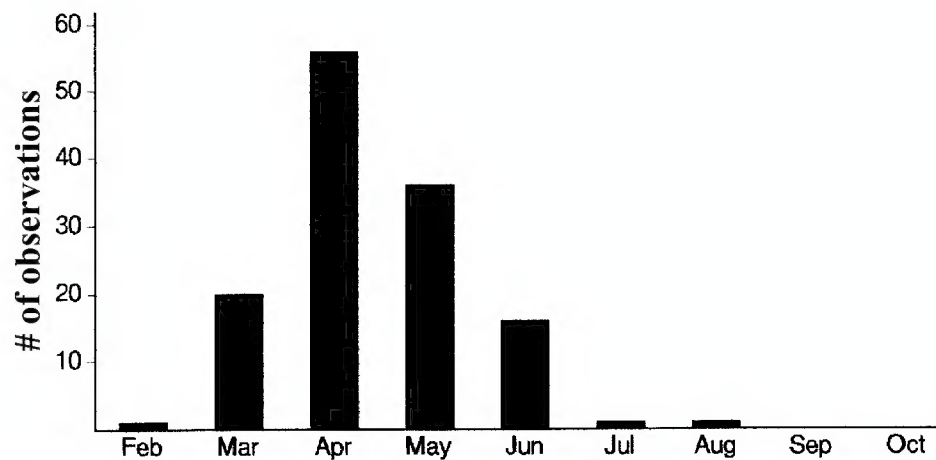


Figure 1. Annual activity of *Clemmys guttata* from Erie County, Pennsylvania. Includes observations made prior to the mark-recapture study. Data from August 1996 to June 2003.

ed 22.61°C; this seems to be the case in Erie County as well.

The most frequently observed behavior was basking (63%, $n = 65$; see Table 3). Spotted turtles were observed basking from 1020 to 1750 h. Mean CT of basking *C. guttata* from Erie County, was 18.7 °C (SD = 5.0, $n = 47$, range 6.4–26.4). This is significantly lower than reported for southeastern Pennsylvania ($t = 3.64$, $df = 231$, $p < 0.0001$) or Georgian Bay, Ontario ($t^* = 9.03$, $df = 46.4$, $p < 0.0001$), where mean CTs were 21.5 and 25.3 °C, respectively (Ernst, 1982; Litzgus and Brooks, 2000). Mean CT of turtles moving in water was 18.3°C (SD = 5.0, $n = 10$, range 12.4–26.2), which is similar to temperatures of southeastern Pennsylvania *C. guttata* (Ernst, 1982). A single observation of courtship behavior was made 23 April 2002, and consisted of a male (0036) pursuing a female (0035) in the shallows of the beaver pond. Insufficient data were collected for other activities to make comparisons between studies. Table 4 summarizes the temperature data for spotted turtles from this study. Average cloacal temperature increased along with air and water temperatures as the season progressed, with the mean CT in March being 8.9°C, increasing to an average of 25.2 °C in June (Table 5). A similar trend has been reported for Maryland, Ohio, southeastern Pennsylvania, and South Carolina (Lovich, 1988). Spotted turtles in the present study used both available wetland habitats extensively, with 55% ($n = 57$) of captures being made in the vernal pool, while 43% ($n = 43$) were made in the beaver pond. Overland movement was rarely observed, with only two turtles found on land. On several occasions, however, spotted turtles (two

males and five females) were captured in one wetland and later in the other, suggesting that turtles traveled at least 20 m overland between habitats. *Clemmys guttata* from southeastern Pennsylvania traveled up to 250 m from the water; however, most normal daily movements were less than 20 m (Ernst, 1976). Movement between wetlands in spring by males has been reported by Perillo (1997); she suggested that traveling between areas may have increased mating chances of male turtles. In the present study, females represented 71% of the total number of turtles moving between wetlands. Perhaps females were also trying to increase their mating opportunities, or perhaps were taking advantage of the abundant food supply, consisting mainly of amphibian larvae and invertebrates in the vernal pool. Alternatively, females may have been moving towards better nesting sites. Both noted movements by males ($n = 2$) were from the vernal pool to the beaver pond.

Population characteristics - Figure 2 presents the population size structure for the 38 *C. guttata* captured during the Erie County study. Population size was estimated to be 40 adult spotted turtles (95% CI = 35–45). Small population size seems to be typical for *C. guttata*. Of seven studies listed in Graham (1995) and Milam and Melvin (2001), five (71%) report estimated population sizes of 55 turtles or less. Ernst (1976), however, obtained estimates of 127–258 spotted turtles in southeastern Pennsylvania; whereas Graham (1995) reported an estimate of 1,204 (± 688) spotted turtles for a Massachusetts population. In the Northeast, such high population sizes are probably the exception rather than the rule. Density for my study was 6.08 turtles/ha for the total study area, and 19.05 turtles/ha for the wetlands only. My estimates of density are lower than reported by Ernst (1976) for southeastern Pennsylvania, but higher than densities from other populations (see for example Ward et al., 1976; Capler and Moll, 1988; Graham, 1995; Haxton and Berrill, 1999; Milam and Melvin, 2001). Density estimates for spotted turtles range from 0.40 turtles/ha

Table 3. Behavior prior to capture of *Clemmys guttata* from Erie County, Pennsylvania.

Behavior	Number of observations	Percent of total
Basking	65	63.1
Swimming	13	12.6
Stationary in water	7	6.8
Stationary on land	1	1.0
Moving about on land	1	1.0
In funnel trap	16	15.5
Total	103	100.0

Table 4. Cloacal and environmental temperatures of Erie County, Pennsylvania, *Clemmys guttata* during various activities. Temperatures are in degrees Celsius. Multiple observations are shown as the sample mean $\pm$ standard deviation, with the number of observations in parentheses beneath. An * denotes that only a single observation was available and that the value represents an individual observation, not a mean. Courtship data, in addition to being shown as a separate activity, are also included in the “Moving in water” category.

Activity	Temperatures		
	Cloacal	Air	Water
Basking	18.7 $\pm$ 5.0 (47)	17.6 $\pm$ 5.7 (58)	15.2 $\pm$ 4.5 (55)
Moving in water	18.3 $\pm$ 5.0 (10)	20.7 $\pm$ 7.8 (11)	16.2 $\pm$ 4.4 (11)
Stationary in water	13.1 $\pm$ 4.7 (4)	18.4 $\pm$ 6.9 (7)	14.5 $\pm$ 4.2 (7)
Courtship	12.6 $\pm$ 0.3 (2)	9.0 $\pm$ 0.0 (2)	10.0 $\pm$ 0.0 (2)
Stationary on land	26.4*	30.0*	22.0*
Moving on land	29.8*	19.5*	12.2*

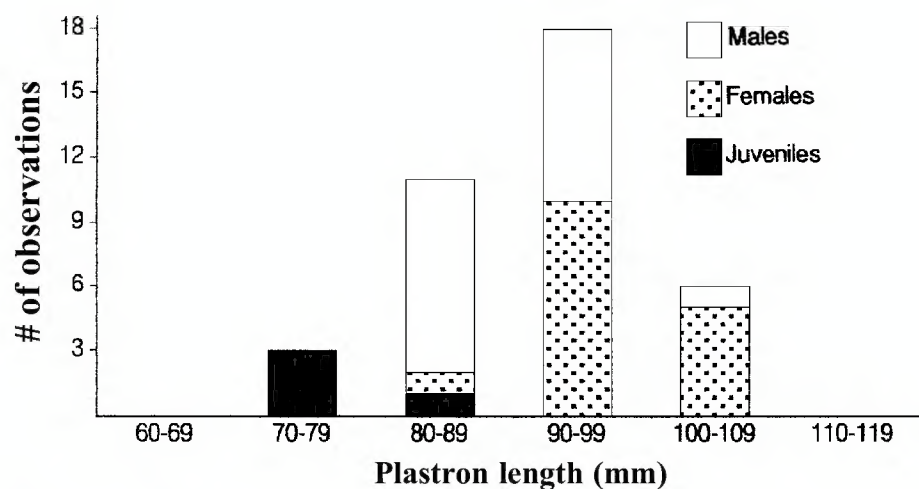


Figure 2. Population size structure of 38 *Clemmys guttata* from Erie County, Pennsylvania. Data used are from initial captures.

in Ontario, Canada (Haxton and Berrill, 1999), to 79.63 turtles/ha for Lancaster County, Pennsylvania (Ernst, 1976). When compared to densities of other species of North American freshwater turtles (e.g., *C. picta* and *Trachemys scripta*), spotted turtle densities are considerably lower (Litzgus, 1996). Milam and Melvin (2001) noted that most studies of spotted turtles only report density for the available wetland habitat, even though spotted turtles utilize upland and wetland habitats extensively. It is therefore important when making between-site comparisons to make sure that the methods (total area or wetland area only) used to estimate density are complementary. Milam and Melvin (2001) also suggest that density estimates based on wetland and upland habitats may be more meaningful, ecologically and from a conservation perspective.

The total sex ratio of males to females was 20:18, which does not differ significantly from 1:1 ($\chi^2 = 0.22$, $df = 1$, $p > 0.01$). Ernst (1976) and Graham (1995) have also obtained sex ratios that were not significantly different from 1:1, which appears to be the norm in freshwater turtle populations (Bury, 1979). This is interesting since in *C. guttata* and most other turtle species, sex is determined by environmental temperatures within the nest (TSD = temperature dependent sex determination). Therefore a potential exists to produce sex ratios that are unusually skewed toward one sex or the other (Ewert and Nelson, 1991; Pough et al., 2001). Subadults in western Erie County represented 11% ($n = 4$) of the total number of turtles caught, with the juvenile to adult ratio being 1:8.5. In other populations, juveniles have been reported to represent from 5 to 32% of total captures. In Ohio, juveniles represented 9% ($n = 4$) of a sample of 47 hibernating *C. guttata* (Lewis and Ritzenthaler, 1997). Ernst (1976) obtained

a juvenile to adult ratio of 1:2.06 with juveniles representing 32% of his Lancaster County, Pennsylvania, population. Additional reports are: Litzgus and Brooks (1998a) obtained 5% in Georgian Bay, Ontario; Milam and Melvin (2001) in Massachusetts obtained 14%; while juveniles in Graham's (1995) Massachusetts study represented 18% of total captures. The small number of juveniles observed in the present study may be indicative of low recruitment; however, more work needs to be done to determine the extent of recruitment at the Erie County site. Alternatively, the low percentage of juveniles observed during this study could also be because juveniles are harder to observe and capture (Ernst et al., 1994). In addition, juvenile *C. guttata* may be utilizing different habitats than those used by adults.

Biomass of adult spotted turtles was estimated to be 3.45 kg/ha for the wetlands and 1.16 kg/ha for the total study area. Biomass of Lancaster County *C. guttata* has been reported to range from 4.3 to 8.7 kg/ha (Ernst et al., 1994).

Predation - Evidence of attempted predation, consisting primarily of chew marks on the carapace and or plastron, was observed in 25 turtles (65.8%). The proportion of males to females with injuries to the shell was not significantly different ($\chi^2 = 0.385$, $df = 1$, $p > 0.01$). Klemens (1993) also reported a high proportion (70%, 14 of 20) of individuals with healed predatory injuries in a population at Hyde Park, New York. Spotted turtles in the present study showed a higher incidence of shell injuries compared to southeastern Pennsylvania or Ohio, where 17.9 and 31% of adults, respectively, had injuries (Ernst, 1976; Lovich, 1989). The higher percentage of shell injuries in the Erie County population compared to other sites could be caused by differences in the relative densities of predators and turtles between sites. The age structure between the turtle populations may also be a factor. Turtles are long lived and there is an extended period of time (up to at least 30 yrs in *C. guttata*) for which they are "targets" for predators. Therefore, a population composed primarily of relatively old individuals would be expected to have a higher incidence of predator related injuries than a population with a majority of younger turtles.

No mortality was observed during the course of the present study; however, the shells of two adults and a dead hatchling were found at the site between 1996 and 1998 (S. Bloomstine, pers. com.). Possible predators at the site include raccoons (*Procyon lotor*), skunks (*Mephitis mephitis*), Coyotes (*Canis latrans*), and domestic dogs (*C. domesticus*). On several

Table 5. Monthly comparisons of average cloacal, air and water temperatures of *Clemmys guttata* from western Erie County, Pennsylvania.

Month	Temperature (°C)								
	Cloacal			Air			Water		
	Mean ± SD	Range	N	Mean ± SD	Range	N	Mean ± SD	Range	N
March	8.9 ± 3.5	6.4 – 14.0	4	10.1 ± 0.5	9.5 – 10.5	4	6.0 ± 0.8	5.0 – 7.0	4
April	17.1 ± 4.4	7.0 – 29.8	34	17.9 ± 6.8	9.0 – 30.0	47	14.4 ± 3.8	8.0 – 22.2	40
May	21.6 ± 3.7	15.0 – 26.4	25	19.5 ± 4.5	13.0 – 28.0	28	16.9 ± 3.5	11.0 – 22.2	28
June	25.2 ± 1.1	24.4 – 26.4	3	23.2 ± 5.6	16.0 – 30.0	10	19.4 ± 2.8	16.0 – 23.0	9

occasions, people have been observed fishing in the nearby permanent ponds and hunting in the woodlands at the site. Due to the significant number of people who visit the site, the possibility exists that turtles may be collected as pets. Burger and Garber (1995) demonstrated that negative impacts to turtle populations may occur at sites open to recreation. In a period of 9 yrs, two wood turtle (*Glyptemys insculpta*) populations studied by them experienced drastic declines after the sites were open to hiking and fishing. The primary causes of decline were low recruitment and loss of adult females (Garber and Burger, 1995). The removal of turtles from an area for the purpose of acquiring a pet or any other reason, has the same effect on the population as does mortality. In Pennsylvania, persons 16 yrs old or older with a fishing license may take and/or possess two spotted turtles. If a person were to collect two females from the Erie County population (which appears to be average-sized for northeastern *C. guttata*), this would represent 11% of the total number of females in the population. It has been noted that spotted turtle populations that have low reproductive frequency, low recruitment, and delayed maturity, may not be able to sustain even a slight increase in adult mortality (Litzgus and Brooks, 1998a). In the Erie County population, 11 percent would surely be more than a slight increase. Illegal poaching also negatively impacts spotted turtle populations (Ernst et al., 1994; Blankenship, 1999). Blankenship (1999)

reported on the largest turtle poaching case in Pennsylvania history. The Bedford County man who was arrested had over 20 spotted turtles in his possession. It is doubtful that many *C. guttata* populations could endure such an increase in “mortality.”

Additional research needs to be conducted to determine the reproductive biology, home range, and extent of habitat use of spotted turtles at the Erie County site. It would also be of interest to determine if nearby areas support the species, and if so, do spotted turtles travel between these sites? Furthermore, it is my opinion that surveys to determine the current status of spotted turtle populations in Pennsylvania are needed, and if necessary, changes should be made to the current regulations, such as lowering the take and possession limit from two to one or zero. In addition, for the long-term preservation of spotted turtles throughout their range, conservation plans need to consider the importance of preserving metapopulations and functional ecosystems (Klemens, 2000).

Acknowledgments

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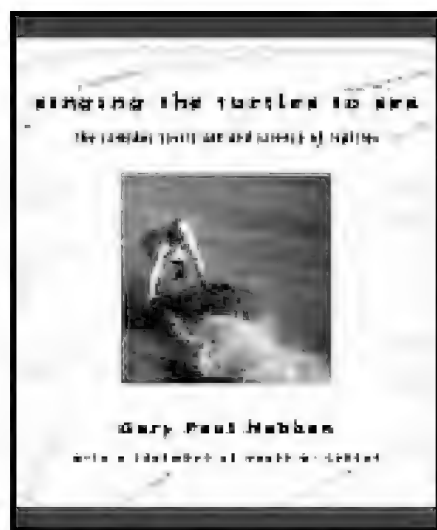
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Book Review: *Singing the Turtles to Sea: The Comcáac (Seri) Art and Science of Reptiles* by Gary Paul Nabhan. 2003. University of California Press, Berkeley. xviii + 317 pp. Cloth. \$34.95. ISBN 0-520-21731-4

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I wasn't sure what to expect of *Singing the Turtles to Sea*, a new book by Gary Nabhan, when I first read the title. My suspicion was that it might be one of those travelogue books with some nice pictures but not much in the way of natural history information. To my pleasant surprise, it turned out to be something very different:



a seamless blend of herpetology, ecology, ethnography, and conservation, written for professional and layperson alike. The book is unlike any other herpetological publication I've ever read.

As herpetologist Harry W. Greene notes in the foreword, this book "provides a case study in ethnoherpetology" or the study of the relationships between human cultures and reptiles and amphibians. Nabhan, an ethnobiologist and director of the Center for Sustainable Environments at Northern Arizona University, spent major parts of the past three decades studying the Seri Indians, or Comcáac as they call themselves, of coastal Sonora, Mexico. The Comcáac (singular: Cmique), who today number fewer than 700, speak a distinct tongue (Cmique Iitom), and have been described as North America's last hunter-gatherer people. Like some of the animals and plants they harvest for food, medicine, and crafts, the Comcáac culture has become endangered by the growing pressures of the 21st century world.

The book is separated into two main parts. Part 1 is a description of the Comcáac people and their history, belief systems, and use of natural resources (primarily reptiles) and is divided into eight chapters. In Chapter 1 ("Islands of Uniqueness: Endangered Cultural Knowledge of Endemic Crea-

tures"), Nabhan describes the endemic and precarious status of the Comcáac culture and language and explores the concept of "endangerment" as it applies to both the Comcáac and the region's biota. The following chapter ("Mapping the Comcáac Sense of Place: Seri Homelands and Reptilian Habitats") discusses the geographic area and place names of the Comcáac world. Important localities range from Tiburón Island off the Sonoran coast (where the Comcáac believe they originated) to the many water holes of the region, oases so precious they are believed to be guarded by a great serpent.

Chapter 3 ("The Shape of Reptilian Worlds: Island Biogeography and the Herpetofauna of the Sea of Cortés Region") is an overview of the reptiles known to the Comcáac, where they occur, and the role of cultural dispersal in shaping their current distributions. Human transport has apparently played a role, both accidental (geckoes stowing away on boats) and purposeful (the release of chuckwalla on some islands as a food source for stranded fishermen), in the animal and plant distributions seen along the Sonoran coast today.

Comcáac taxonomy of reptiles is discussed in Chapter 4 ("Naming the Menagerie: How to Sort One Snake from Another"). The system of naming used by the Comcáac differs in some respects from that of Western scientists, but the overlap is remarkable in many instances. There is even disagreement among the Comcáac on how to classify various species, not unlike the lack of consensus often seen among herpetologists! The following chapter ("Reptiles as Resources, Curses, and Cures") explores the association of reptile species with beauty (evocation in songs, elaboration in drawing, carving, basketry, etc.), utility (use as food, ornament, utensil, medicine, or sellable item), or danger (by envenomation, biting, or contact). For example, although the harmless geckos and night snakes are associated with danger, the venomous coral snake is over-

whelmingly associated with beauty. The desert iguana, a harmless species, is especially feared, and figures only in “horror stories” in Comcáac culture. However, Nabhan notes that, in general, “[i]f ophidiophobia does occur among the Comcáac, it appears to be overridden by the utility and beauty of local reptiles. . . .”

Also discussed is the well-known Comcáac art of carving animal figures, especially reptiles and amphibians. This important industry for the Comcáac has expanded greatly since the 1960s, and although initially confined to sandstone as a medium, carvings are now done in ironwood, elephant tree wood, and other types of stone. The huge demand for ironwood carvings has not only resulted in many non-Comcáac carvers producing copies of authentic Comcáac art, but major loss of ironwood habitat in Sonora and Arizona.

Nabhan also describes the Comcáac perceptions of local ecological interactions in various habitats, including the relationships between different reptiles. Although the perceptions often differ from those of Western scientists, he notes:

[W]hen I consider whether the Comcáac focus only on these ecological interactions involving the most economically valuable species in their midst, I see no obvious bias. Utility alone is not a good predictor of Comcáac interest in the natural world. Some ecological processes may simply be more fascinating to the human mind than others, regardless of their practical value. I have been struck at the number of times a Seri ecotourist guide and foreign naturalists have stood together watching ecological interactions in utter delight: those between whip-snake and rattler, horned lizard and ant, or tortoise and cactus. Academic scientists may ask different questions and answer them using different tools than do local naturalists, but the same sense of biophilia holds when they witness a female sea turtle lumber onto a beach to lay her eggs or a spiny-tailed iguana climb high into the arms of a Cardón cactus. [p. 174]

Chapter 7 (“The Comcáac as Conservationists: Practicing What They Preach, and Benefiting from Alliances”) and Chapter 8 (“The Historic Decline and Recent Revival of Traditional Ecological Knowledge,”) explore the loss and renewal of naturalist lore among the Comcáac and its importance to species conservation. Tradition and customs have been lost among the youth, particularly girls, as they become immersed in the surrounding Mexican culture. Some changes are attributable to technological changes that have made certain practices, such as herbal remedies for snakebite, obsolete with the advent of modern clinics. Other activities (such as singing a leatherback sea turtle onto the beach, ceremonially painting it, then releasing it back to sea) have almost disappeared as the species involved in the rituals have become scarce. Some practices have declined for less obvious reasons, but are symptomatic of a growing detachment from the natural world. Take the example of the bandless sand snake, a harmless burrowing species. Nabhan notes that “[e]lderly Seri women recalled being present when someone would capture this little snake by hand, then move it across the belly and small of the back of a pregnant relative, to make the forthcoming baby as sleek and unblemished as the snake itself.” This remarkable custom, as well as familiarity with the snake

itself, has essentially vanished. Recent efforts by Nabhan and others to train Comcáac as “para-ecologists,” naturalists skilled in both traditional ecological lore and modern natural resources management, promises to reverse the decline in endemic knowledge and provide conservation benefits to many species as well.

Part 2 of the book is an excellent set of accounts of all the reptile species known to the Comcáac, and includes the scientific, English, Spanish, and Comcáac names for each animal. There is also a discussion of how each animal got its Comcáac name and what the Comcáac know of its natural history. Following these accounts, there is an appendix of reptile specimen records from the Sonoran coast and nearby islands in the Sea of Cortés, with information on museum specimens and literature citations for each species. This appendix, one of several features in the book that might have been omitted without diminishing the overall value of the volume, shows the author’s remarkable attention to detail and his desire to produce a publication with highly varied uses to many different readers.

The book is very well illustrated and includes numerous photographs of the Comcáac, their crafts, and the herpetofauna and habitats of Sonora. Several maps, tables, and graphs provide an extraordinary amount of detail that both ethnographers and biologists will find useful. For example, there is a table that describes the stages in reptile bite diagnosis and treatment by the Comcáac, and another that details the various plants and their preparation used in such treatment. There is a Literature Cited section and a very good index.

I found very few errors in the book. The snake illustrated in Plate 10 is not a kingsnake, as the caption states, but a gopher snake (*Pituophis*). The citation of the book by W. G. Degenhardt et al. (1996) in the Literature Cited section has the wrong initial for the lead author. I did not do a thorough review of the scientific names used, but Nabhan draws on many very recent publications concerning the reptiles of the region and is clearly familiar with the local taxa, although he claims no training as a herpetologist.

For those readers who own a copy of the comprehensive herpetofaunal study of Baja California by Grismer (2002), *Singing the Turtles to Sea* will be a nice complementary guide to the people and reptiles on the other side of the Sea of Cortés. Because many of the same reptiles and islands are considered in both books, I believe the owners of Grismer’s book will find Nabhan’s volume a valuable reference.

I highly recommend this book to anyone interested in the native peoples, fauna and flora of Mexico. For those intrigued by the often strange relationship between humans and herpetofauna, this is an invaluable case study (although Nabhan cautions that “the riddle of reptiles’ primacy in the human psyche has not yet been solved.”) Every reader will be left with a deeper appreciation of how the fates of human and nonhuman animals are intertwined in our increasingly crowded and homogeneous world.

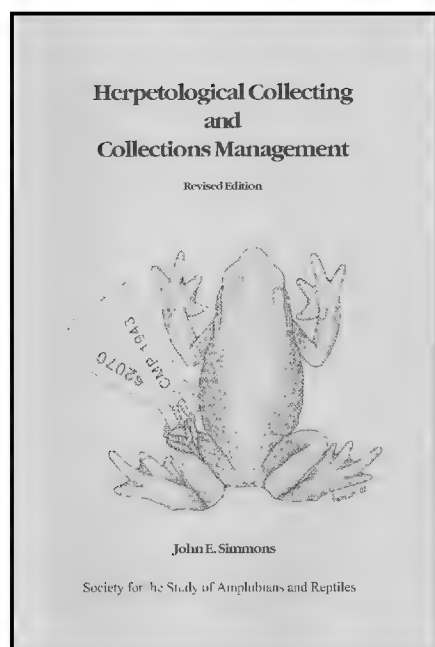
Literature Cited

- Grismer, L. L. 2002. Amphibians and reptiles of Baja California, including its Pacific islands and the islands of the Sea of Cortés. Berkeley: University of California Press.

**Book Review: *Herpetological Collecting and Collections Management, Revised Edition*
by John E. Simmons. 2002. Society for the Study of Amphibians and Reptiles,
Herpetological Circular Number 31. 153 pp. Paperback. ISBN 0-916984-60-5. \$16.00**

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Herpetological Collecting and Collections Management by John E. Simmons is a familiar book to anyone who works with reptiles and amphibians in a museum setting. However, it is also a book that is useful and interesting for anyone interested in herpetology. As Simmons points out, "If field workers understand how specimens are processed and used in museums, they will prepare better specimens. If collection users understand how animals are collected and preserved in the field, they will make better use of the specimens. If all of us understand how collections are managed, specimens will be better utilized and preserved for the future." The revised edition, published in 2002, is a significant improvement on the 1987 edition; it is more comprehensive, better organized, and still inexpensive enough that everyone interested in herpetology should have a copy in their library.



The book is organized into four parts that give brief but information-rich accounts of the history of collections, the methods of collecting, preserving, and collection management. There is no filler in this book; every sentence conveys important information and nearly every paragraph cites fundamental studies in herpetology or collections care. The appendices are also valuable and current. They include a nearly exhaustive field gear checklist and lists of places to obtain permits, information, and supplies.

Part One, "A Brief History of Systematic Collections and Specimen Preparation," provides the foundation for the rest of the book—why herpetological collections exist and why they must be "managed." Professional herpetologists likely know most of the information in this section but, in a day when many museum collections are undervalued, this section provides a brief but authoritative account of the past, present, and future value of these irreplaceable resources. Such information may be enlightening to other herp enthusiasts and especially to museum personnel who are not involved with the collections.

The second section, "Field Collecting," covers just that—something most herp enthusiasts enjoy, even if they do not take anything home. Several charts and checklists walk the reader through the preparations for collecting. Techniques and tools are explored in detail with an emphasis on legal and ethical collecting. Both the recreational and professional

herper will find that this information helps them prepare for the field. Professionals will also appreciate the up-to-date citations of collecting methods and the evaluations of these methods in procuring specimens and data. Collection of sound and photographic evidence are covered more effectively than in the previous edition. There is also a section on snakebite treatment covering the basic information that everyone in the field should know.

I particularly like the quote in this section from Hornaday: "Bad work in collecting is, nine times out of ten, due to one of two causes—ignorance or laziness. By some curious process of reasoning, many really intelligent men conclude that they can go into the field and collect successfully without having learned a single thing about methods, or asked a word of advice from a competent instructor." I take this as an admonition that, no matter how early in life an individual began catching herps, they can still learn from other's experiences, including those cited in this book. I also hope that professional herpetologists take Hornaday's words as encouragement to be accessible to both amateurs and the next generation of professionals by attending and speaking at regional herpetological society meetings.

Part Three on "The Preservation of Specimens" will be of particular value to professional herpetologists and students. Like the rest of the book, this section is brief but contains enough detail to make it as valuable as a field guide when collecting, and enough references to provide a foundation for laboratory standard operating procedures. It covers techniques for preservation of reptiles and amphibians in all of their life stages and addresses blood, tissue, and skeleton preparation. Standard preservation procedures are clearly outlined, making it easy for researchers to quickly familiarize themselves with the techniques used with the various herp groups. Like the part on field collecting, this one includes a series of checklists that make preparations for field or lab work much easier.

Collections care has experienced many significant advances in the past decade. Part four, "Museum Collections," reflects this, being almost as long as the entire 1987 edition. The extra length is due to more extensive coverage of the topic, greater detail than before, and the inclusion of useful charts and forms. Despite the increased number of pages, this is not much space to address such a broad topic, but Simmons's succinct presentation provides enough detail to satisfy most readers. For those who require more information, frequent citations provide references to the most relevant papers. The fact that many of the cited papers were published in the 1990s indicates that Simmons has provided the reader with the most

current understanding of how collections should be handled.

Part Four touches on nearly every aspect of the collection once the specimen arrives at the museum — from theory to practice and from jars to buildings. Broadly, this section covers “maintaining the integrity of the specimens and their associated data, maintaining the specimens and data in optimum usable condition, and making the specimens and data available for appropriate use.” While it contains the kinds of specific information one would expect associated with these topics, such as ways to protect the specimens from damage, it also includes things like a chart for evaluating the long-term usefulness of a fluid preserved specimen and a section on fire codes and safety regulations. Other notable topics in this section include resources for developing collections management policies, evaluations of data recording tools and specimen/data association methods, comparisons of container and stopper materials, discussions of loans, handling procedures, and conservation techniques, and examples of necessary data forms. There are many other topics that I have not listed here that are similarly useful and treated in the light of the most recent studies and current practices. This entire section is useful to anyone who ever deals with collections of any kind and it is invaluable to a herpetological collections manager.

In addition to the four main parts, the thirteen pages of Literature Cited represent the most recent studies and fundamental texts that address the various issues in this book. A

quick comparison between the current edition and the earlier one shows that the list of citations has been significantly expanded and updated, which, in itself, is a good reason to keep the current edition handy.

Appendices I and III provide current details (including mailing addresses, phone numbers, and websites) for sources of information on permits, and supplies for the field and lab. The field gear checklist in Appendix II is extensive and obviously based on experience. Reading it reminds one that a collecting expedition, especially in a foreign country, is not just a camping trip. I would like to hear the story that prompted the note that an emery board can also be used for filing broken teeth. Although no general gear list is perfect, this one will certainly make creating a custom list easier and the advice interspersed throughout the list should certainly be read by those preparing for their first expedition.

As populations of amphibians and reptiles around the world dwindle, collections of herpetological specimens become more and more important. In *Herpetological Collecting and Collections Management*, Simmons has outlined how to ensure the preservation of these specimens. His clear presentation, current and relevant citations, and broad treatment of the subject make this an interesting and important reference. This book is an essential text for professional herpetologists, collection managers, and students as well as anyone who deals with, or is curious about, museum collections and herpetology.

Bull. Chicago Herp. Soc. 39(2):32-34, 2004

HerPET-POURRI

by Ellin Beltz

Bad news, good news

Some of this month's stories are the sort that always makes me want to quit writing about reptiles and amphibians. But then I think about the lovely wall plaque I just received last month from the CHS. It is a Board Merit Award, 2003, “For outstanding achievements and contributions to the advancement of The Chicago Herpetological Society.” With thanks to the Board for letting me know that someone, somewhere really does read this column — and has for the past 18 years! I also got a lovely present from Marty Marcus. It is a pristine envelope with every single one of the reptiles and amphibians stamps four times! He wrote, “I think it is pretty neat that the Post Office not only put out these stamps, but promoted them as part of their annual ‘stamp collecting month’ program.” Thanks to the Board, the Members and Marty for making me feel really good about writing this month, even if some of the stories below are real bummers.

Frog mural saved

Many years ago, an artist painted an odd frog and the words “Hi, How Are You” on the wall near the University of Texas at Austin. When the building changed hands, the new owners didn't know the historic significance of the Jeremiah mural and was planning on painting over the 10 foot frog until the local outcry made him realize that it was an important piece of art.

You can see pictures of the mural on the artist's website < <http://www.hihowareyou.com/muralpics.htm> > or read the story on the Associated Press, January 9, 2004.

Noah only needed two of each

A German man was arrested at Lima airport by Peruvian customs officers with 450 tropical frogs and an assortment of bugs and beetles in his luggage. He claimed he wanted to start a zoo at home in Frankfurt. [BBC News, January 29, 2004; <http://news.bbc.co.uk/2/hi/americas/3442007.stm>]

A dubious honor

The Australian Broadcasting Company reports that the single largest illegal collection of non-native reptiles ever found in Australia has led to its owner being fined \$5,000 (Australian) for keeping about 90 different snakes at his home in Churchill. His snakes included red-tailed boas, rainbow boas, carpet pythons and kingsnakes. [January 20, 2004; <http://abc.net.au/news/australia/vic/200401/s1028618.htm>]

Loss of life or livelihood?

- According to the National Marine Fisheries Service, too many turtles are dying on hooks set for swordfish by commercial long-lining boats in the Pacific. The mostly Vietnamese-

American fishermen involved claim that any regulation would cost them their ability to make a living. The proposed regulations ban fishing in the top 100 feet of the water where most of the turtles hang out. Of course, that's where the commercially appealing fish hang out, too. If all goes well, the regulations go into effect in mid-March, 2004. [*Times-Standard*, Eureka, California, December 19, 2003, from K. S. Mierzwa, and *Chicago Tribune*, December 26, 2003, from Ray Boldt]

- “I would like to compliment [recent U.S. government agency actions] . . . as a move in the right direction to solve the problem of sea turtle by-catch. . . . Despite the development of a [differently angled] circle hook . . . a change in bait from squid to mackerel and the development of a ‘leatherback lift,’ the new plan will have little impact on leatherback sea turtles. The female nesting population of the leatherback has been estimated to have declined by 95% in the past two decades. . . .” The writer works for the Sea Turtle Restoration Project. [*Honolulu Advertiser*, January 13, 2004, from Ms. G. E. Chow]

Coqui Monsters

- Studies show that populations of non-native coqui frogs, *Eleutherodactylus coqui*, and their slightly quieter relatives, *Eleutherodactylus planirostris*, in Hawai'i can reach densities up to ten times greater than at their native source in Puerto Rico. Coqui frogs probably arrived in Hawai'i on non-native tropical plants. A survey about five years ago discovered about 80,000 coqui in the study area which was only one of many on that island. Coqui are “well established in Hilo, Puna and Kailua-Kona, and have been reported . . . in Hawi, the South Kohala resort area, Waipio Valley, Honokaa, Volcan, Naalehu and Honaunau. Each coqui consumes almost six insects per night. . . . [They] severely impact food sources for native birds . . . [and] are also loud . . . registering about 70 decibels.” Efforts continue to remove or eliminate the frogs, especially in the East Hawaii community of tropical plant growers where populations are, not surprisingly, the highest. One of the state reps has posted information about the coqui and what the state is doing to get rid of them on her website: <http://www.repcindyevans.com>. [*West Hawaii Today*, January 16, 2004, from Paul Breese]

- “Ontario has more species of amphibians than any other [Canadian] province or territory . . . due to the presence of diverse types of habitats containing wetlands at least part of the year. . . . Canada is home to 45 species . . . 24 frogs and toads and 21 salamanders. Sadly 10 anuran species . . . have been designated Species at Risk. . . . Blanchard's cricket frog has been extirpated in Canada since 1989 . . . last known habitat on Pelee Island in southeastern Ontario, not a single spring call has been heard since . . . [1989] [D]esignated as threatened, the Fowler's toad, along with five other Canadian anurans listed as species of special concern. . . . For more information or to participate in the program, please log on to: <http://www.frogwatch.ca>. Adopt-A-Pond produces . . . the Amphibians of Ontario Identifier Guide, Poster and the Frog Calls of Ontario Tape . . . [or visit] < <http://www.torontozoo.com/adoptapond>> to learn their calls.” [*Amphibian Voice*, Volume 13, Number 4, Winter 2003, from Tom Johnson]

Just peachy for the local tourism industry

- “Leaving only the shells and a few other body parts to float onto the beach . . . poachers killed 111 protected sea turtles off the . . . coast resort city of Acapulco during early January.” [*Honolulu Advertiser*, January 18, 2004, from Ms. G. E. Chow]

- As if cutting them up and letting them wash ashore was not gross and evil enough, now reports come from the beaches 130 miles north of Acapulco that turtle poachers have slaughtered hundreds of endangered sea turtles and just taken some meat and eggs from them; leaving them to die in agony. More than 100 skulls and shells have been recovered by heartbroken volunteers. [Reuters News Service, February 3, 2004; <http://www.planetark.com/dailynewsstory.cfm/newsid/23677/-story.htm>]

What a job!

“The U.S. Department of Commerce granted the Palau Bureau of Marine Resources \$86,000 to begin a [sea] turtle monitoring project [in February 2004]. . . . Palau [is] a chain of more than 200 islands about 4,000 miles southwest of Hawai'i. In addition to tagging and releasing about 50 young turtles, the project also plans to catch adult turtles and attach satellite transmitters on them to monitor their movements.” [*Honolulu Advertiser*, January 14, 2004, from Ms. G. E. Chow]

Mothra Stewart?

Heidi Fleiss who was convicted at a trial after her lawyers advised her not to take the stand in her own defense suggested perhaps home products diva Martha Stewart should also remain silent. “Toads come out of her mouth—the jury won't like her,” she predicted. [*Ananova*, January 30, 2004; http://www.ananova.com/news/story/sm_860879.html Thanks to Jack Fertig for the headline.]

Yes, but do they swallow?

Syndicated columnist and motivational speaker Jim Davidson wrote: Many people over the past several years have asked me how “Toad Suck” [Days in Arkansas] got its name. Now there are a lot of local people who have been around a lot longer and know a lot more about this than I do, but if you have never heard this story it might be of interest to you. One thing for sure, the “Toad Suck” name makes our festival unique. Here's the story. Back in the days before the 21 locks and dams were built, the water level of the Arkansas River would fluctuate dramatically, depending on how much rain we had and especially how much it had rained upstream. When a tugboat pushing barges would head up the river, they were literally at the mercy of the elements. During the summer months when the water was low, quite often a tugboat would make it as far as Conway, but could go no further until the rains came. Of course, when the tugboat was tied up at the bank, the captain and crew had to do something to pass the time away. Well, some enterprising fellow built a tavern on a high hill overlooking the river and these riverboat sailors would make their way to the tavern and partake of the local hospitality. The report came that over a period of several days these men would sit on a stool and “suck” on corn mesh whiskey or rum until they literally swelled up like “toads.” Thus the name “Toad Suck.” This is not a name that I would want

to give one of my kids, but as Paul Harvey would say, “Now you know the rest of the story.” [*The Southern Illinoisian*, January 17, 2004; <http://www.southernillinoisian.com/rednews/2004/01/17/build/opinions/OPI003.html>]

Voting green

They have a thing about colors in Georgia. Their state symbols are grits, peanuts, peaches and now, green treefrogs. Georgia also has a state bird, fossil, reptile, possum and cook off. [*Associated Press*, February 3, 2004]

Better than Goliath?

The Midrand Journal reported on January 22, 2004: “Consider the giant bullfrog, but better from a distance. Vile tempered, toothy, carnivorous and the size of a medium pizza at adulthood, it bites hard enough to dent a broomstick. It has been known to lunch on rinkhals, a cousin of the cobra. It has attacked lions and even elephants when provoked. Kermit would disown it.” Tiny transmitters were installed in the frogs which usually live from one to three feet underground. “‘ Among people who follow frogs, it is a very interesting species,’ said . . . a zoologist who has studied the bullfrog for 13 years. ‘ The goliath’s only claim to fame is that it is a large frog. It doesn’t have any of the character or behavior of the giant bullfrog.’ . . . Only now that it is listed . . . as a “near threatened” species is the bullfrog gaining more attention. A tiny band of enthusiasts is trying to save it from the onslaught of houses and highways that have wiped out much of its habitat in prime breeding areas around Johannesburg and Pretoria [South Africa]. . . . It can weigh up to four-and-a-half pounds. It spends most of its life span of 35 to 40 years underground. In the dry season, it burrows under the mud, secreting mucous and shedding layers of skin until it has formed a hard cocoon, leaving an opening only for its nostrils. It can survive up to seven years like that. . . . When enough rain falls to moisten and split the cocoon, the bullfrog surfaces, usually once a year around November, to eat and mate. . . . The biggest males stake out their mating territory and issue a low-pitched whooping sound to attract the females. The smaller males hang around the periphery, hoping to get lucky. . . . Contested, a big male can turn lethal, tossing its competitor into the air and tearing out huge chunks of skin with his sharp teeth. Once the eggs are fertilized, the biggest males transform again from fierce studs to devoted dads. The females vanish and the males stand guard for several weeks as the eggs hatch and the tadpoles develop. That sets them apart from most frogs. . . . If the water in the shallow pond becomes too warm, or a tadpole gets stranded, [he] said, the father frog will dig a channel to cooler or deeper water.” These bullfrogs have reportedly stood up to lions and eaten venomous snakes. [<http://www.nytimes.com/2004/01/29/international/africa/29FROG.html>]

Sometimes you don’t get what you expect

I thought for sure I would get dozens of copies of an article about a reported “49-foot, 938-pound snake” being kept in Curugsewu, Indonesia. The photo, of course, shows no such thing. Probably a math error, suggested more than one reader, others pointed out that this is just another case of “stretching the truth” on snake lengths and that it looks like a particularly

well fed python, it is certainly not the length of two longbed pickup trucks or two city lots. Incidentally the only paper copy I got was from the *Orlando Sentinel*, December 31, 2003, from Bill Burnett.

BrekkakCoax or BrekkakLegLeg?

Chris Kattan, a seven-year veteran of NBC’s “Saturday Night Live” show is leaving to perform in a new Stephen Sondheim musical loosely based on Aristophanes’ comedy *The Frogs*. He will play the slave Xanthias who accompanies his master Dionysus on a journey to the underworld where they try to get a famous writer to help them save the world. Previews of *The Frogs* will begin on June 7. [February 2, 2004; <http://www.chron.com/cs/CDA/ssistory.mpl/ae/2383612>]

Mousicles and Ratbars?

An article in the *Chicago Tribune* bemoans the lack of funding of the historic Trailside Museum and wildlife rehabilitation center. It reminds me of a time quite a while ago now, that my husband and his coworkers spent much of a year snap-trapping and live-trapping small mammals as part of a large federal contract. All those little furry things ended up in my freezer until one night when I reached up and into the door box to take out a bunch of corn dogs and instead encountered a plastic-wrapped shrew (*Blarina brevicauda*, for those of you who want specifics). To this day, I do not think my husband fully understands how close he came to being served said shrew, impaled on a corndog stick. A few days later, I told this story at a company picnic and the very next day my husband was told to go buy a chest freezer at company expense. So we went to an appliance store and bought a lovely freezer, including a little basket for the little shrews and small mice. The salesmen were sure they were dealing with Morticia and Gomez Addams. Time passed. The mice stayed frozen in case anyone wanted to check their work. Finally, I got an agreement to dispose of the mice and I called Trailside and offered them about 25 pounds of various small mammals as food items for their rehab animals. After assuring the nice lady that all the permits were totally in order and providing copies of same, she told me to bring out my collection of cervically dislocated data points. I don’t know how it is now, but then we had a long walk lugging black plastic bags along a sidewalk lined with old wire silos full of owls, raptors and foxes. Every eye was on us; even the owls popped an eyelid. We left the bags where we were told and left. Surprisingly, the animals were not fooled. They kept staring toward the building and ignored us on our way out. Since the freezer was now empty, I persuaded another CHS member with a pickup truck to help me take it to their downtown office tower and put it in their workroom where it presumably filled up again, but was no longer my problem. [November 28, 2003, from Ray Boldt]

Thanks to everyone who contributed this month and to Louis Somma, Joe Collins, Ray Boldt. You can contribute too. Send stuff about reptiles and amphibians with your name and the publication slug on each page to: Ellin Beltz, POB 1125, Ferndale, CA 95536-1125. Check out all the updates on my website, too: <http://ebeltz.net>. Please do send something. I only have five pages and one letter left from this month!

Herpetology 2004

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

REDISCOVERY OF A WEST AFRICAN AMPHISBAENIAN

W. R. Branch et al. [2003, African J. Herpetology 52(2): 93-100] report on a small series of amphisbaenians from the Toucan/Rabi region, Ogooué-Maritime Province, southwestern Gabon. The series includes five specimens of *Cynisca bifrontalis* (Boulenger 1906), previously known only from the holotype, and five specimens of *Monopeltis galeata* (Hallowell 1852). The Toucan/Rabi material represents a range extension of 90 km southeast for both species. Morphological variation in the new material is discussed. Body annuli counts in both species differ from documented ranges, but the possible taxonomic significance of this cannot be assessed until larger series become available. Like congeners with extensively fused head shields, *C. bifrontalis* displays variability in cephalic scutellation. Pre-cloacal pores in females are represented by small scale depressions, but these lack secretion cores. The species reaches a snout-vent length of only 131 mm and is thus one of the smallest known fossorial reptiles. *Cynisca haughi* (Mocquard 1904) is poorly diagnosed and its taxonomic status requires further study.

NORTHERN WATERSNAKE COLORATION

K. D. Bowen [2003, J. Herpetology 37(4):729-731] notes that juvenile northern watersnakes, *Nerodia sipedon sipedon*, possess a striking dorsal pattern, whereas adults often have a more uniform dorsal coloration. Past researchers have hypothesized that this color shift occurs through a darkening of the ground color, but this hypothesis has never been tested quantitatively. Analysis of digital images of the dorsum and venter of *N. s. sipedon* individuals of all sizes from islands in Lake Michigan indicated that as snakes increase in length, the dorsal ground color darkens, but the coloration of dorsal blotches and ventral pattern does not change. Potential costs and benefits of a change in dorsal coloration while ventral pattern remains relatively constant are discussed in relation to variation in size.

ESTIVATION IN SONORAN MUD TURTLES

D. B. Ligon and P. A. Stone [2003, J. Herpetology 37(4): 750-754] examined drought-related survival strategies in a population of Sonoran mud turtles (*Kinosternon sonoriense*) inhabiting an ephemeral stream in the Peloncillo Mountains, New Mexico. Behavioral responses to seasonal drying of the habitat were investigated via radiotelemetry and repeated sampling of the resident population. All transmitted turtles were observed engaging in terrestrial dormancy for periods of 11 to 34 days. Two nontransmitted turtles remained in a small puddle through the drought, and no turtles were observed migrating to permanent bodies of water. Results indicate that estivation is the dominant drought-survival strategy employed by *K. sonoriense* in the study population.

A LITTLE KNOWN WATER SKINK FROM VIETNAM

A. Ngo et al. [2000, Russian J. Herpetology 7(2):155-158] note that the Ba Vi water skink, *Tropidophorus baviensis*, was described from Ba Vi, Vietnam, by René Bourret in 1939 based on one specimen. The authors collected a series of 31 animals from the same location. They provide a redescription of *T. baviensis* and discuss the extent of morphological variation in this series. The holotype falls within the variation observed in the new sample. All specimens were found in a road cut away from water. The females of this species appear to invest parental care in their offspring, as all juveniles were accompanied by an adult female.

WINTERING GREEN ANOLES

D. C. Bishop and A. C. Echternacht [2003, Copeia 2003(4): 906-909] report that green anoles, *Anolis carolinensis*, do not hibernate, and in an East Tennessee population near the northern limit of its geographic range, individuals aggregate on a south-facing rock bluff and are active throughout the winter. During the winters of 1998-1999 and 1999-2000, the authors obtained data on body size (snout-vent length [SVL] and mass) of aggregated lizards early in the season and again in March. There was significant growth in SVL in both field seasons but in mass only in 1999-2000. Growth rate was greater in 1999-2000 than in 1998-1999, possibly attributable to the earlier onset of warmer temperatures in 1999-2000. Males grew at a greater rate than females. The data also indicate that the winter sex ratio of aggregated individuals is male-biased.

ARGENTINE BOA CONSTRICTOR REPRODUCTION

M. Bertona and M. Chiaraviglio [2003, J. Herpetology 37(3): 510-516] provide data on sexual dimorphism, reproductive biology, and mating aggregations of the Argentine boa constrictor (*Boa constrictor occidentalis*), a poorly known, threatened species. Snakes were examined by ultrasound scanning between 1998 and 2001. Adult females were 14% longer and 51% more massive than adult males. Litter size averaged 25.05 and increased significantly with maternal body size. Reproductive activity was seasonal and associated, with vitellogenesis and spermatogenesis occurring during the dry season (April to September). The ratio of reproductive to nonreproductive females was 1:1, suggesting females do not reproduce annually in this population. Reproductive females were in better body condition (mass relative to body length) than nonreproductive females, indicating that a female's initial "decision" to reproduce in any given year may be driven by her body condition (storing enough energy for a long period before expending it on reproduction: "capital breeder"). Aggregated boas were found only during the dry season. The high proportion of solitary reproductive males and the operational sex ratio (male:female, 1.53:1) suggests a system of "prolonged mate-searching polygyny."

The Tympanum

A recent article in the *Bulletin of the Chicago Herpetological Society* (Cochran, 2003) cited a book by Jones (2000) in which the anthropologist author explained the widespread presence of mythical dragons in many human cultures. Jones suggested that the dragon represented “an amalgamation of three important human predators: the serpent, the raptor and the feline.”

Students of dragon mythology might be interested in another book (Mayor, 2000) that explores the origin of mythical creatures such as dragons, griffins, cyclopes and giants beginning with the ancient Greeks and Romans. This author argues that such mythical beasts are based on the very real fossil remains of large prehistoric animals. For instance, the gold-guarding griffin is likely based on the presence of very common *Protoceratops* fossils and their eggs near ancient gold mines in the Altai Mountains of the Gobi desert. This ceratopsian dinosaur was a quadruped, yet laid eggs and had a birdlike beak and pelvis. Their fossils are so common that in two summers beginning in 1922, Roy Chapman Andrews found more than 100 *Protoceratops* skeletons in the Altai Mountains.

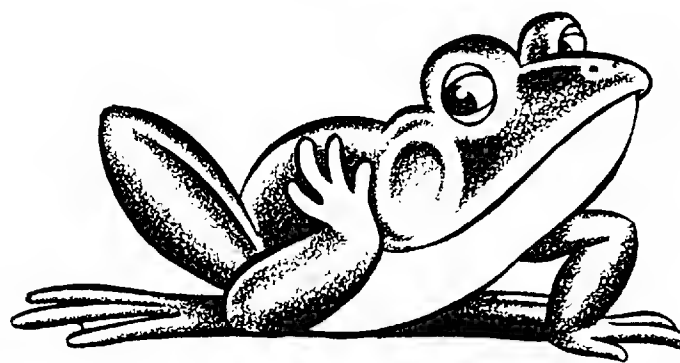
Mayor also cites the model of a dragon built in Klagenfurt, Austria, in 1590. The head of this model was based on the skull of an Ice Age woolly rhinoceros discovered in a local quarry in 1335.

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Cochran, P. A. 2003. Some cases of herpetological misinformation. Bull. Chicago Herp. Soc. 38(12):240-241.

Jones, D. E. 2000. An instinct for dragons. New York: Routledge.

Mayor, A. 2000. The first fossil hunters: Paleontology in Greek and Roman times. Princeton, New Jersey: Princeton University Press.



single species.

The notion that salamanders are particularly dense (in terms of biomass) was triggered by: Burton, T. M., and G. E. Likens. 1975. Salamander populations and biomass in the Hubbard Brook Experimental Forest, New Hampshire. Copeia 1975:541-546.

My notes on this paper say: 2950/ha (1.8 kg/ha), of which 93.5% in *P. cinereus*; this biomass is about twice that of birds (peak breeding) and equal to small mammals.

Let me see if I can put this information in context. It is one of only a few studies that have estimated assemblage biomass densities of herps. I have endeavored to collect all such records that include lizards (these are reported in the Rodda and Dean-Bradley paper cited above), but I have not gotten all the amphibian papers. Because frogs are relatively massive, I would expect larger biomass densities among frogs. For example, I've personally recorded biomass densities of *Bufo marinus* of >50 kg/ha. Of the 44 terrestrial frog biomass densities I have extracted from the literature, 14 are > 1.8 kg/ha, the widely-cited Burton and Likens figure. I don't know what the maximum salamander biomass density is, but the large numbers I have seen were all from small rocky areas that would not be representative of larger landscapes. In contrast, many tropical frogs are dense over vast areas. Considering terrestrial lizard assemblages, I found 67 records, of which 24 were > 1.8 kg/ha (max 42.13 kg/ha). Considering studies of arboreal and terrestrial lizard assemblages combined (n = 43), 28 are > 1.8 kg/ha (max. 53.67 kg/ha). Finally, my data base on single species records (n = 1146) records 281 records > 1.8 kg/ha, with a staggering maximum of 228 kg/ha for *Gallotia stehlini* in the Canary Islands. I believe that Aldabra tortoises are in that range as well (though good data are unavailable).

Given the globally limited range of high density salamander assemblages (eastern U.S.), and the welter of data on higher biomass densities of other herp taxa, I suspect (nobody knows) that salamanders are not THAT underrated in comparison to other herps. What is clear is that herps frequently exceed the biomass densities of mere birds and mammals. Birds and mammals may be conspicuous but their incredibly inefficient metabolisms restrict them to densities that are a small fraction of that achieved by the more efficient (and undoubtedly more interesting) herpetofauna.

Cheers, **Gordon Rodda, USGS Fort Collins Science Center,
2150 Centre Ave., Bldg. C, Fort Collins CO 80526-8118.**

Ellin,

Your remark in the December issue of Bull. CHS [HerPET-POURRI, p. 247] that salamanders probably outweigh all the other herp groups in terms of biomass, set me off. A paper of relevance that you might enjoy is: Rodda, G. H., G. Perry, R. J. Rondeau, and J. D. Lazell, Jr. 2001. The densest terrestrial vertebrate. J. Trop. Ecol. 17:331-338. . . . This paper's title is pretty self-explanatory (the current champion is a West Indian gecko), but it addresses only the question of densities of single species. Your remark was targeted at salamanders as a group. For biomass densities of groups of herps, you might enjoy: Rodda, G. H., and K. Dean-Bradley. 2002. Excess density compensation of island herpetofaunal assemblages. J. Biogeog. 29:1-10. . . . That paper reviews biomass densities of herpetofaunal assemblages rather than

Unofficial Minutes of the CHS Board Meeting, January 16, 2004

Lori King called the meeting to order at 7:38 P.M. Board member Betsy Davis was absent.

Officers' Reports

Recording Secretary: Melanie Aspan read Mike Dloogatch's minutes of the December 12 board meeting. The minutes were accepted with no corrections.

Treasurer: Jim Hoffman presented his usual balance sheet with an overview for new board members on how it is set up. He also presented additional informational reports regarding isolated income and expense reports for certain categories including Membership. This led to a discussion regarding the cost of mailing out membership cards. Brian Jones made a motion to continue to send cards to new members, but to cease sending cards to renewing members. The motion was seconded and passed, John Bailey abstaining, all others in favor.

Membership Secretary: Mike Dloogatch noted that for the fourth month in a row we've had an increase in membership.

Vice-President: Linda Malawy announced the speaker for the January 28 general meeting: Dr. R. Kathryn Vaughan will speak on "The Natural History of *Leptotyphlops*."

Corresponding Secretary: Steve Spitzer said that he has already sent out a thank-you note and is looking into both retrieving the voicemail instruction booklet from his predecessor and ordering stationery.

Committee Reports

ReptileFest: Ron Humbert and Linda Malawy have picked up 170 new all-glass 10-gallon tanks from Milwaukee. Some of the tanks will also be used as future raffle items. A special thank-you goes out to Budget Rent-a-Car of Naperville for their generous pricing of a rental truck.

Grants: It was announced that so far 21 grant applications have arrived for 2004.

Shows: Jenny Vollman presented dates for the shows at the Notebaert Museum for the next few months and asked for volunteers to coordinate some of the weekends. Lori King discussed the publicity involved with the Notebaert Museum and its upcoming "When Crocodiles Ruled" exhibit. Jenny also mentioned the Chicagoland Pet Show coming up in March, and Ron Humbert mentioned the "Coping with the Cold" show at the Springbrook Nature Center in Itasca on January 18.

Raffle: It was determined that there are enough items to cover the January general meeting raffle. Steve Spitzer plans to send letters soliciting donations. Brian Jones offered several large cages he is no longer in need of as raffle items.

Adoptions: Linda Malawy announced \$560 in donations between this month and last. Lori King mentioned the transportation of the next set of crocodilians to Florida. It was suggested that perhaps we could take advantage of the Notebaert Museum's exhibit "When Crocodiles Ruled" to raise money specifically for this purpose.

Speakers Bureau: Matt Campbell is working to get a group together to brainstorm ideas.

Chicago Wilderness: Lori King suggested taking this item off the agenda unless someone would like to take on the role of

liaison between Chicago Wilderness and the CHS so that the society could take a more active role. Ron Humbert agreed to look over the latest correspondence from them.

Old Business

Salamander Safari: The next date is March 27, 2004. As usual, we are hoping for rain.

State Reptile/Amphibian: Ron Humbert has met with Representative Bob Biggins on this issue. There is a meeting scheduled to discuss the funds needed for the endeavor. Schools are on notice that the vote is upcoming.

Proposed Chicago Animal Ban Ordinance: Lori King reported that a date has not yet been set for the committee meeting.

Storage Room: So far nothing has been found.

Letter Response: The Board discussed a member issue.

General Meeting Short Presentations: Ron Humbert confirmed that he will be presenting at both the January and February general meetings. He announced that he is looking for volunteers to continue the series.

Laminating Machine: The machine is suspected to be in the possession of Darin Croft. Plans were made to retrieve it.

New Business

New Judge for Animal of the Month: Rich Crowley will be unable to attend the general meetings for the next few months. He has enlisted Sean Bober to take over temporarily.

Tablecloths for Shows: Linda Malawy has received an offer of 35 white banquet tablecloths at a discounted price.

PARC: Lori King gave an overview of PARC and requested that the board look over the information contained in the bound material she provided.

Ideas and Suggestions

Yard Sale: The idea of having a yard sale to benefit the CHS was discussed. The issue of where to hold it was brought up and remained undecided.

Steve Spitzer made a motion to donate \$50 to the ICFFCI (International Conservation Fund for Fiji's Crested Iguana) in memory of Betsy Davis's mother. The motion was seconded and passed, all in favor.

Round Table

Matt Campbell asked if anyone is interested (or knows of anyone interested) in a breeding pair of Honduran milksnakes.

Steve Spitzer announced that his daughter is selling Krispy Kreme Doughnut cards as a fundraiser.

Linda Malawy suggested Matt Campbell contact Mike Redmer regarding copyrights for Speakers Bureau presentations.

Lori King offered copies of the first issue of *Fauna* magazine's new publication, *The Keeper*. She also called attention to an article she found in *BioScience* on the value of museum collections.

The meeting adjourned at 10:12 P.M.

Respectfully submitted by Melanie Aspan, Recording Secretary.

Chicago Herpetological Society
Income Statement: January 1 – December 31, 2003

Income		Expense	
Adoptions / Crickets	\$ 3,900.48	Adoptions / Crickets	\$ 1,485.65
Grants	292.53	Grants	2,750.00
ReptileFest	24,167.00	ReptileFest	16,556.03
Other CHS Shows	2,194.00	Other CHS Shows	1,938.54
Zoo Trip	1,152.00	Zoo Trip	1,240.30
Merchandise Sales	1,635.00	Merchandise Sales	1,279.82
Conservation–Massasaugas	962.00	Conservation–Massasaugas	1,536.54
Conservation–<i>Cyclura</i>	2,283.00	Conservation–<i>Cyclura</i>	1,744.00
Conservation–CIG*	49.00	Printing / Duplicating	16,728.95
Membership Dues	17,858.33	Addressing / Mailing Service	2,471.85
Contributions	1,068.00	Awards	665.19
Amazon.com	110.05	Bank Fees	23.50
Bulletin Ads	214.00	Donations	100.00
Bulletin Back Issues	174.00	Liability Insurance	2,750.00
Foreign Postage	203.00	Licenses and Permits	18.00
Interest	168.22	Meals	28.78
Raffle	1,003.40	Office Supplies	183.63
		Postage	3,810.95
		Speaker Reimbursement	2,052.67
		Telephone	631.49
		Miscellaneous	355.54
Total Income	\$57,434.01	Total Expense	\$58,351.43

* CIG = Cryptobranchid Interest Group

Net Income (\$917.42)

Chicago Herpetological Society
Balance Sheet: December 31, 2003

Assets

Harris Checking	\$ 6,357.37
Harris Money Market	29,165.02
Total Assets	<u>\$35,522.39</u>

Equity

Restricted – Adoptions	\$ 2,414.83
Restricted – Grants	184.74
Restricted – Massasauga	781.36
Restricted – <i>Cyclura</i>	539.00
Restricted – CIG	49.00
Retained Earnings	32,470.88
Net Income	(917.42)
Total Equity	<u>\$35,522.39</u>

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutritionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, \$.17 each; fuzzies, \$.24 each; hoppers, \$.30 each; weanling, \$.42; adult, \$.48. Rats: starting with pinks at \$.45 each, to XL at \$1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. PO Box 85, Alpine TX 79831. Call **toll-free** at (800) 720-0076 or visit our website: <http://www.themousefactory.com>.

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice available: small newborn pinks up to jumbo adults. Prices start at \$25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: *Natural History of the Hognose Snakes* Heterodon platyrhinos and Heterodon nasicus, by Dwight Platt, 1969, pp. 255-420, 7 b&w plates, tables and figs., softbound, \$32; *Natural History of Cottonmouth Moccasin*, Agkistrodon piscivorus (*Reptilia*) by Ray D. Burkett, 1966, pp. 437-491, 13 tables, 5 figs., softbound, \$26; *The Reptiles & Amphibians of Alabama* by Robert Mount, 1975, 345 pp., 350 figs. (b&w photos and range maps), softbound, \$26; *Reptiles of Australia* by Charles Barrett, 1950, 168 pp., many b&w photos, figs., drawings, no DJ, hardbound, \$95; *The Snakes of Australia* by J. R. Kinghorn, 1964 (revised ed.), 197 pp., many color drawings, 9 b&w plates, DJ, hardbound, \$25; *Wildlife in Papua New Guinea* by Eric Lindgren, 1975, 196 pp., 193 color photos, DJ slightly torn, hardbound, \$32. All books in excellent condition except as noted. Prices include postage. Send E-mail address for complete list. William R. Turner, 7395 S. Downing Circle West, Littleton, CO 80122, (303) 795-5128. E-mail: toursbyturner@aol.com.

For sale: **c.b. '03 unusual garter snakes**. **Plains**: one male and two female albinos, varying degrees of orange, lavender, pink and white all intermixed, unscented pinky feeders, \$150 each; two male and one female Nebraska snow Plains, lavender, pink and white all intermixed, all are eating unscented pinks, \$275 each; one male and one female red albino Plains (produced from high red double het red albino female), \$125 each; **wandering garters**: 2.1 normals (female has a fairly severely clipped tail, does not invade the cloaca region), all are unscented pinky feeders, \$50 trio; **Florida blue-striped (similis)**: Mark Malfatti bloodlines (best of the best), \$40 each, \$100/pair shipped to your door; one female '03 erythristic × melanistic (currently hibernating), approximately 10", eats unscented f/t pinks, \$50. **Adults/breeder size**: one male 2001 California red-sided (currently hibernating), flawless, approximately 16" long and eats f/t mice, \$250; one female 2002 Christmas albino Plains garter (currently hibernating), approximately 24", eating f/t small adults, \$300. Quantity discounts. Shipping is extra. Contact Scott via email SFelzersgarters@nc.rr.com or call (919) 365-6120 EST. Web address is <http://www.gartersnakemorphs.com>.

Herp Tours: Why pay more? Travel with the International Fauna Society, a 501 (c)3 not-for-profit organization, and experience the Costa Rican rainforest! Stay at the beautiful Esquinas Rainforest Lodge in the untouched herpetological paradise that is Piedras Blancas National Park. Meet new friends, relax in the naturally-filtered swimming pool or in the lush, fauna-filled tropical garden. Discounts for IFS and Chicago Herp Society members. For details, visit The International Fauna Society website at www.faunasociety.org or E-mail: joea@faunasociety.org.

Herp tours: Adventure trips to **Madagascar**! Journey somewhere truly unique to seek and photograph nature on the world's least-studied mini-continent. For maximum herp fun and discovery, join Bill Love as we go where few people will ever venture in their lives. Let his experience assure a comfortable tour finding the most colorful and bizarre species on the planet! Get all the details at Blue Chameleon Ventures' comprehensive new website: <http://www.bluechameleon.org>, E-mail: bill@bluechameleon.org, or call (239) 728-2390.

Herp tours: Experience the Amazon! Road-ride in Costa Rica! See and photograph herps where they live, have fun doing it, make good friends and contacts, and best of all . . . **relax!** From wildlife tours to adventure travel, **GreenTracks, Inc.** offers the best trips led by internationally acclaimed herpers and naturalists. See our website <http://www.greentracks.com> or call (800) 9-MONKEY. E-mail: greentracks@frontier.net.

Internship: The Kentucky Reptile Zoo, a nonprofit organization, seeks student interns for the 2004 spring, summer and fall seasons. The zoo is an educational exhibit, reptile breeding and venom research facility located near Kentucky's Red River Gorge and Natural Bridge State Park. The intern will assist in the captive maintenance of the zoo's reptile collection, collect admissions to the exhibit, give interpretive talks and interact with the public, assist with educational outreach programs, and perform other duties as assigned. In addition, the intern will be responsible for the completion of at least one research project related to the field of herpetology. The intern will not be involved in the handling of any venomous reptiles. Desirable qualifications include a willingness to handle snakes and other reptiles on a daily basis, ability to communicate effectively with people, writing skills, orientation to details, and self-motivation. The intern will be required to work both Saturday and Sunday, with days off during the week. Interns are required to be either current college students or recent graduates; students majoring in the biological or natural sciences are preferred. Former interns have arranged for academic credit with their colleges or universities. Interns have also been successful in finding zookeeper positions, with a hire rate of over 95%! Benefits include experience with the most extensive and diverse collection of snakes in the U.S., housing and \$55/week to cover expenses. Personal transportation is recommended. A valid driver's license is required. Starting dates are flexible, but a minimum commitment of 3 months covering spring (March–May), summer (June–August), or fall (September–November) is required. To apply send a cover letter, resume, transcript, and at least 2 (preferably 3) references to: Kristen Wiley, Internship Coordinator, Kentucky Reptile Zoo, 200 L&E Railroad, Slade KY 40376. Or E-mail: kyreptil@mailhost.mis.net.

Pet Sitting: In-home care for all your pets' needs. Specializing in reptiles, amphibians, birds, fish, dogs, cats. . . . Very passionate in herpetology, experienced vet technician at an exotic animal hospital, aquarium technician for over 10 years. Great references available. Call Lisa Collins to book your special care requests, (847) 644-3681. [Northshore based]

Wanted: **Cape cobra information**. I am seeking data for captive breedings of *Naja nivea*. My primary purpose is to establish the number of eggs laid (any double clutches?) and most important the color of the neonates immediately after emergence. Contact: Karl Switak at khs@sonic.net.



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Every year ReptileFest gets bigger and better. As the new show coordinator, I'd like to see that trend continue.

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This is **YOUR** Society's biggest interaction with the public, the most publicized event, and the most lucrative fundraiser of the year. We can't do it without **YOU**. **YOU**, the one who has never been to a meeting, but really enjoys the Bulletin.

YOU, the one who takes advantage of our adoption program to both give and receive. **YOU**, the one who goes on great field trips. **YOU**, the one who attends terrific lectures.

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I'm talking to YOU!!

We need help from everyone, and I can find jobs for everyone who volunteers.

Only have one animal? Bring it!

You'll be able to concentrate more on one animal.

Think your animals are too ordinary to show?

The public will love them, guaranteed, especially when you're talking enthusiastically about them.

Don't want to show your animals? You can still do important and fun jobs at the show.

Can't be there both days? One day will make a difference.

Out of town that weekend, or can't stand mixing with the public?

Don't attend, but you can still help us out between now and then.

Too young or too old? Some of our most popular participants are.



Use the enclosed sheet to exhibit, or go to www.chicagoherp.org.

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Don't have a computer? Call me, John Archer, at 630-351-4251.

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CALL NOW—THIS OFFER EXPIRES APRIL 4, 2004.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, February 25, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. As always, we will have an excellent program, but as of this writing the exact nature of that program is not known.

The March 31 meeting will feature **Danté Fenolio**, a graduate student at the University of Oklahoma, speaking on “The Herpetofauna Exploiting Termite Mounds of the Upper Tocantins River Valley, Brazil.” Danté is known to many of you as the author of numerous articles in *Reptiles* magazine.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago’s newest museum — the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the March 19 board meeting, to be held at the North Park Village Administration Building, 5801 North Pulaski Road, Chicago. To get there take the Edens Expressway, I-94, and exit at Peterson eastbound. Go a mile east to Pulaski, turn right and go south to the first traffic light. Turn left at the light into the North Park Village complex. At the entrance is a stop sign and a guardhouse. When you come to a second stop sign, the administration building is the large building ahead and to your left. There is a free parking lot behind the building.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info call Lisa Koester, (773) 508-0034, or visit the CTC website: <http://www.geocities.com/~chicagoturtle>.

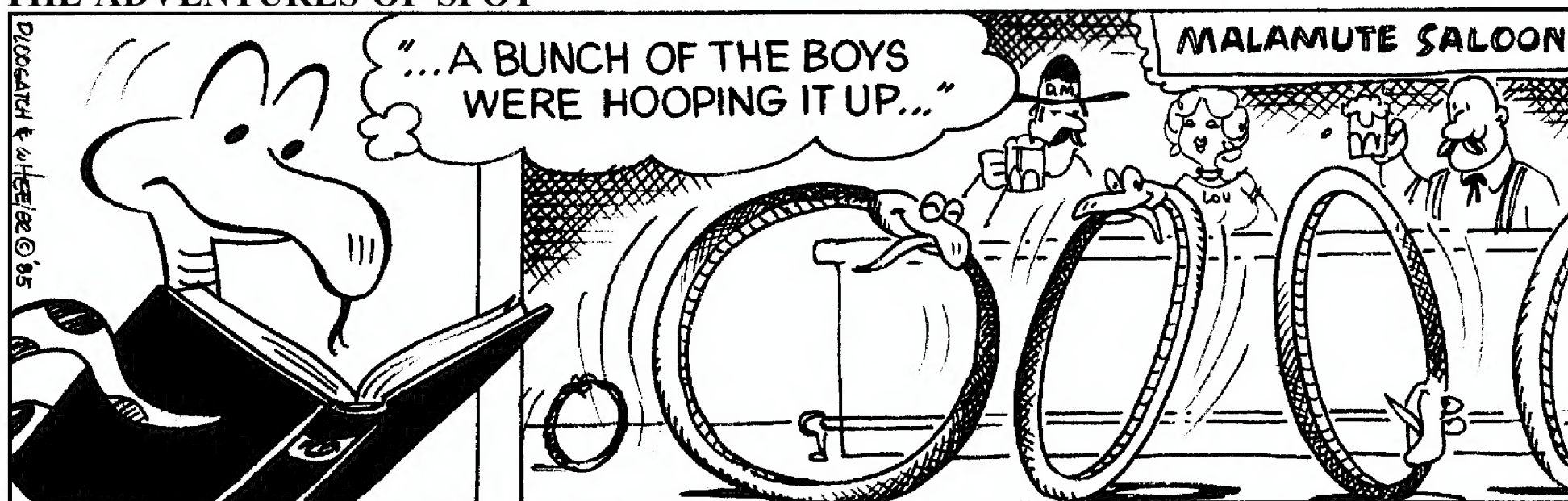
2004 SALAMANDER SAFARI

This year, the annual CHS Salamander Safari will be held on Saturday, March 27, 10 A.M. — 3 P.M., beginning at the Plum Creek Nature Center at Goodenow Grove Forest Preserve in Will County. Goodenow Grove is south of Crete, Illinois, 1¼ miles east of the intersection of Route 1 and Route 394 on Goodenow Road. If you need directions to get to this area, call Ron Humbert at (630) 620-7377. From the nature center we will drive to other Forest Preserve District of Will County sites to search for amphibians. Species found or heard calling in previous inventories include spotted salamanders, blue-spotted salamanders, gray treefrogs, spring peepers, chorus frogs, bullfrogs, green frogs, and northern leopard frogs. Species not yet found but possibly occurring (or occurring at preserves nearby) include newts and wood frogs. As in past safaris, CHS members are encouraged to bring interesting amphibians from their personal collections for photography and display purposes. Coffee, juice and donuts will be provided, and a good time will be had by all!

HERP OF THE MONTH

Each monthly meeting will showcase a different herp. CHS members are urged to bring one specimen of the “Herp of the Month” to be judged against the entries from other CHS members. Prizes will be awarded to the top three winners as follows: 1st place—6 raffle tickets at next meeting; 2nd place—4 raffle tickets at next meeting; 3rd place—2 raffle tickets at next meeting. Here are the categories for the coming months: February — Herps from Africa; March — Amphibians of the world; April — Beginner herps; May — Herps from Madagascar.

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